

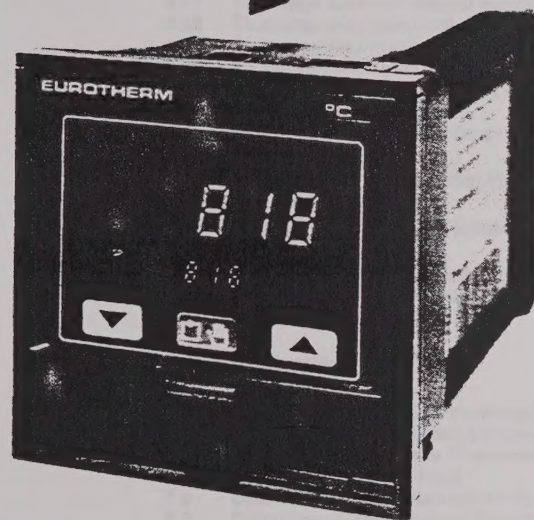
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**EUROTHERM
CONTROLS**

Engineering Manual

MODEL 818 DIGITAL CONTROLLER



Doc. No. HA133673
Issue 3

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Chapter 1.0

Standard Precautions

When designing any control system it is essential to consider what will happen if any individual part of the system malfunctions.

In a temperature control application, for example, the danger is that for some reason the heating system remains permanently switched on.

This could happen if:

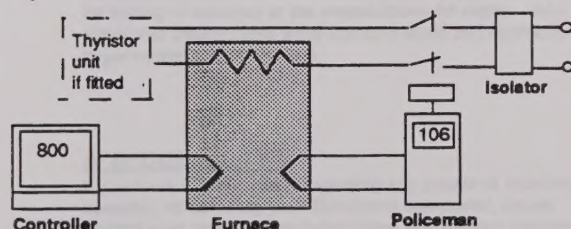
1. Thermocouple or sensor becomes "detached" from the system i.e. it is no longer measuring the actual temperature achieved.
2. Thermocouple or thermocouple wiring becomes short-circuited.
3. Component failure within the controller in such a way as to leave the output switched on.
4. Microprocessor or software failure in a system.
5. Failure of valve movement or valve linkage.
6. Remote setpoint to controller is faulty.
7. Operation by unauthorised personnel.
e.g. (a) Controller left in Manual with high output power set.
(b) Setpoint set too high
8. Any lack of maintenance in serviceable parts.

....and many other unforeseen situations.

If leaving the heater on all the time can cause damage either to the plant itself or its contents, then an independent protection device must be provided.

The best form of protection is a completely independent 'policeman'. This is a separate overtemperature alarm with its own thermocouple or sensor and, on alarm will pull out the main contactor or shut off the valve to ensure the plant's safety.

e.g.



A suitable policeman is the Eurotherm 106 overtemperature alarm. Note that an alarm relay in the main controller is **NOT** sufficient protection for all eventualities.



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1.9 Supply Impedance

Control cabinets and equipment should be sited as close to the incoming supply as possible. This is essential on high power systems using thyristors driving large transformer loads. In all cases, both inside and outside the cabinet, long supply cables should be avoided. If they are unavoidable, conductors of an adequate rating must be used. Avoid running instruments from a supply which has shared wiring with high current circuits, particularly if these are switched by contactors or thyristors.

1.10 Plant and Personnel Protection

On control applications it is essential to consider what will happen if any individual part of the system malfunctions. Where excessive deviation of a controlled parameter, due to equipment failure, could cause damage to machinery or materials, or injury to personnel, it is recommended that an additional separate unit, such as the Eurotherm 106, with its own separate sensor, be used to give alarm indication or to shut down the process or both, as may be appropriate.

Note: "Alarm relays" fitted inside the controller itself may not give sufficient protection in all possible circumstances.

When "alarm units" or "alarm boards" are used they should be checked for correct operation and calibration at regular intervals.

1.11 Hazardous Atmospheres

No product should be connected to a circuit which passes into or through a hazardous area, unless appropriate precautions are taken (even though the instrument itself may be located in a safe area). Such an installation should conform to the requirements of the relevant local regulations.

Unless categorically stated in the published specification of any particular unit, it should be assumed they are not suitable for direct use in areas subject to hazardous atmospheres.

1.12 Procedure in the Event of Trouble

Before beginning any investigation of a fault, the electrical supplies to all equipment concerned should be switched off and isolated. Units suspected of being faulty should be disconnected and removed to a properly equipped workshop for testing or returned to the manufacturer for repair. Any attempt to troubleshoot while installed could be hazardous to personnel and equipment.

IF IN DOUBT, ASK!

If you have any questions regarding any aspect of installing, operating or servicing your Eurotherm equipment, please contact your nearest Eurotherm Sales and Service engineer.

Chapter 2.0

Technical Specification

2.1 Inputs

General

Input range :-

-8.0mV to +60mV

Min span :-

5.0mV

Max span: -

68mV

Max zero offset: :-

20% of span (in mV)

Common mode rejection:-

< 50 μ V display change for 264V rms at 50/60Hz

Series mode rejection:-

<50 μ V display change for 50mV rms at 50/60Hz

Input impedance:-

>1M ohm resistive (includes 0.6 μ A open circuit sensor current)

Resolution :-

12 bit for all ranges (14 bit max)

Sample period:-

125 milliseconds

Linearity error:-

Better than $\pm 0.1\%$ of input span.

Thermocouple

Standards:-

British BS4937 (1973) German DIN 43710 US ASTM E230(1972)

Linearsation :-

Better than $\pm 0.2^\circ\text{C}$ for standard thermocouple. Effect of thermocouple lead resistance, 0.5 μ V/ohm

CJC:-

Internal or 0°C , 45°C , 50°C external

Internal CJC Error:-

Typically 0.05 $^\circ\text{C}/^\circ\text{C}$ ambient change (20:1)

RTD

Standards:-

British BS1904 German DIN 43760 PT 100

Linearisation:-

Better than $\pm 0.2^\circ\text{C}$ for standard resistance thermometers

Connection:-

3 Wire automatic lead resistance compensation

Bulb current:-

0.2mA

Lead compensation Error:-

With up to 22 ohms in all three leads no change in display indication

Volts

Range:-

Minimum span 5.00 mV. For spans above 60.0mV an external attenuator mounted in an extension block on the rear terminals is used

Input Impedance:-

>100K ohms

Current

0-20mA or 0-10mA. With all current ranges, burden resistors are mounted onto the rear terminals 2.5 ohms for 20mA input and 5 ohms for 10mA input. Offsets are provided as software option i.e. 4-20mA.

2.2 Outputs (2 or Valve Positioner Drive)

Relay :-

Maximum of 264V 2A ac into resistive load, with spark suppression. On/Off or time proportional. Minimum voltage 30V rms or dc

Leakage current through spark suppression network= 2mA at 264 V ac 50Hz

Triac:-

Maximum of 264V 1A ac into resistive load. On/off or time proportional. Minimum voltage 85V rms. Leakage current through snubber = 2mA at 264V ac 50Hz

Isolated logic:-

20mA at 15Vmin. On/off or time proportional

Cycle Time:-

0.3 to 100 seconds at 50% power (relay 10 to 100 seconds)

Power Feedback:-

Normally fitted to any of the above when using output 1 (heat)

Analogue:-

Isolated dc, 0-10v at 20mA max or 0-20mA at 12 volts.

Offsets provided as software option, i.e. 4-20mA. Output impedance on voltage ranges is < 0.1 ohms (including connectors)

Retransmission:-

Output 2 (cool output) or output 3 (alarm 1) can be designated retransmission output of setpoint, linearised measured variable, error or output power (only one retransmission output available in the controller)

Retransmission Output:-

10 volts span (max), range lying between 0 to +10 volts at 20 mA max. 0-20mA(max) at 12 volts (min) offsets provided as software options, i.e. 4-20mA. Output impedance on voltage ranges is < 0.1 ohms (including connectors)

Retransmission resolution:-

12 bit Effective

Retransmission linearity accuracy:-

Better than 0.5% under all load conditions which are within specifications

Isolation:-

Both output 1 and 2 are isolated from each other and the remainder of the instrument to IEC348, UL1092, VDE411 and BS4743 standards

Reverse/Direct:-

Time proportioning and analogue in output 1 (heat) can be configured either reverse or direct. Output 2 (cool), time proportioning or analogue, is configured as acting the opposite to output 1

Non-Linear:-

Output 2 (cool), when not on/off, can be configured as either linear or non-linear characteristic. The non-linear characteristic is ideal for controlling water which may flash off to steam.

Option:-

Output 2, (3 and 4) may be assigned to control by programmer segments in the 818P/4/15 instruments.

Configuration:-*Isolated remote setpoint, remote trim, output power limit***Resolution:-***12 bit effective***Accuracy:-***Better than 0.5%***Sample period:-***750 milliseconds***Input wiring break:-***Drops to 12%, or below, on inputs configured with 20% offsets, will cause the output to switch to sensor break power and the 'REM' legend to flash.***Analogue Output****General:-***This output gives a retransmission signal representing either the setpoint, the linearised measured value, error or the power. (Only one retransmission output available in the controller.)***Voltage:-***Max 10 volts, range lying between - 5 volts to + 10 volts internal impedance < 0.1 ohms (including connectors)***Impedance:-***Load must be > 500 ohms***Current:-***0-20mA (max) at 12 volts min, offsets provided as software options, ie 4-20mA***Configuration:-***Setpoint, measured value, error, or output power (excludes use of channel 2 or 3 as retransmission).***Resolution:-***12 bit***Linearity Accuracy:-***Better than 0.5% under all load conditions which are within specification.***Digital****Protocol:-***Variable speed link, ASCII format RS232 or RS422/485 protocol ANSI X 3.28 (1976) 2.5 A4, or Modbus® RTU or J-bus® RTU at baud rates variable from 300, 600, 1200, 2400, 3600, 4800 and 9600.***Isolation:-***Between communications link and all other inputs and outputs meets IEC348, UL 1092, VDE 411 and BS4743 standards.***Format:-***Start bit - seven data bits - even parity bit - one stop bit. (ANSI x 3.28 (1976) 2.5A4 Protocol).***Start bit - eight binary data bits, - one stop bit (J-Bus® RTU and Modbus® RTU). (The J-Bus and Modbus can have an optional even parity bit).***Address:-***Two digits***Digital input:-***Overrides, the digital communications link and holds 'keylock' and 'parameter security' disabled.***2.6 Logic Inputs (2)
(Standard on all Instruments).****Drive :-***Pulled up to +5 volts in rest state : must be pulled down to 0 volts with an impedance of < 100 ohms to activate.***Isolation:-***Logic inputs not isolated from one another, or measured value input, but isolated from all other inputs and outputs to IEC348, UL1092, VDE411 and BS4743 standards.***Voltage Level Limits:-***For logic input active the input level must be less than 0.70 volts; for logic input in-active the input level must be greater than 4.00 volts.***Input current:-***0.5mA maximum***Configuration:-***(one only per logic input)***Auto/manual***Ramp enable.***Remote/local***Run/Hold***SP 2 / SP 1***Run/Reset***Adaptive/self tune***Remote up/down key***Keylock***PID 2 / PID 1***Skip Segment***Prog No monitor/step**Parameter modification**Security***Trigger:-***All are level triggered except self tune and skip current segment which are edge triggered.***2.7 Auto-Tune****Self tune (ST) and Fast Self Tune (FST)*:-****Operation:-***A single shot approach, which exercises the output in an on/off mode, measuring the response of the measured value and installing values of PID, cycle time, relative cool gain and, under certain conditions, cutback. During the routine the output is turned off and on to force the self tune routine into a single cycle of oscillation. The fast self tune only performs 1/2 of a cycle.***Enhancements:-***A) Operates in reverse or direct.**B) If integral turned 'off', unit tunes as a PD controller.**C) If integral and derivative turned 'off', unit tunes as a P controller.***Suspension:-***If the instrument is switched to manual whilst in self tune the self tune will be suspended. On reverting to 'auto' the unit will recommence the self tune routine from the start.***Limitation:-***The instrument will not self tune when configured in the on/off mode or when SP2, ramp or programme is enabled.***Abort:-***'Stop' will be flashed into the top display alternating with the measured value if the instrument is unsuccessful in self tuning the loop. Under these circumstances the 'ST' or 'FST' feature should be terminated by manually switching 'off'.*** Only available on instruments fitted with version 2.07 software and above.***Adaptive tune (AT)****Operation:-***A continuous appraisal and re-defining of three term parameters.***Enhancement:-***A) Operates in reverse or direct.**B) Will not introduce derivative if turned 'off'.**C) If integral is turned 'off', the adaptive tune algorithm may switch it 'on' in order to achieve zero error.**D) Will not operate on controller configured with an on/off output.**E) Automatically set trigger level that can also be manually adjusted.****Suspension:-***While switched into 'manual' the adaptive tune will be suspended. It will however be automatically reinstated when the instrument is switched back to 'auto'.*** Only available on instruments fitted with version 2.07 software and above.*

2.12 Setpoints

Instruments can operate on one of the following setpoints:-

Setpoint	Source	Level	Enabling parameter
SP1	Internal	Fixed	(default)
SP2	Internal	Fixed	Digital input or digital comms
Programmer	Internal	Variable	Run button,digital input or digital comms
Ramp	Internal	Variable	Run button,digital input or digital comms
rSP	External	Fixed or Variable	Remote button,digital input or digital comms
LSP + rsP	Internal + External	Fixed or Variable	Remote button,digital input or digital comms.

The current value of the selected setpoint is displayed against the legend 'SP' in the short scroll.

2.13 Switching Modes

Current Mode	Next Mode (Valid Switching) via		Next Mode (Invalid Switching) via any means
	Digital input Digital Comms	Pushbuttons or	
Manual	Auto Run Remote 2 PID 2 SP2 ST AT	Auto (1) Run Remote (2) PID 2 SP2 ST AT SAT	
Remote (Auto)	Not remote Manual AT	Not remote (1) Manual AT	Run SP2 ST SAT
Programmer (Run,Auto)	Hold Reset Manual PID 2 AT	Hold (3) Reset Manual PID 2 AT	Remote SP2 ST SAT
Programmer (Hold) Assuming programme was in Run & Auto	Run Reset Manual PID 2 AT	Run (4) Reset Manual PID 2 AT	Remote SP2 ST SAT
Ramp (Auto)	Remote Manual PID 2 ST AT SAT	Remote Manual PID 2 ST AT SAT Reset	
SP2 (Auto)	Not SP2 Manual AT	Not SP2 (1) Manual AT	Run Remote ST SAT
ST (Auto)	Not ST Manual AT	Not ST (1) Manual AT	Run Remote SP2
AT (Auto)	Not AT Run Remote Manual ST SAT	Not AT(1) Run Remote Manual ST SAT	

- 1) Valid only if current mode was selected via front panel buttons or comms.
- 2) Will select 'remote' on exiting from the 'manual' mode.
- 3) Available only if digital input configured for HOLD ACTIVE.
- 4) Available only if digital input configured for RUN ACTIVE.

Chapter 3.0

Coding with Relationship to Configuration

Instruments are configured to the customers order before leaving the factory. Confirmation of the installed configuration is by the ordering code printed on the side cover of the instrument.

To establish the features that are included in the instrument the ordering code on the side cover of the instrument may be interpreted using the coding chart on the next page. Modifications required to the instrument that can be identified with a change to the model coding, can be accomplished by reference to the paragraph numbers highlighted in the following pages of chapter 3.0.

Input Coding

Curve

Select from the range list shown below

	Notes	Recommended Min & Max ranges	Min Span	Code		Notes	Recommended Min & Max ranges	Min Span	Code
Iron/Constantan J	(1)	0C to 600C	100C	01	Pt100 ohm at 0°C	(2)	-200C to 850C	50C	70
Fe/Konst(DIN) L	(1)	0C to 600C	100C	02	Pyrometer (Q004 Land)	*(4)	800C to 1550C	5mV	48
Ni Cr/Ni Al K	(1)	-250C to 1200C	125C	03	Pyrometer (Q003 Land)	*(4)	700C to 1400C	5mV	51
Cu/Con T	(1)	-250C to 400C	150C	04	Pyrometer RO 26	*(4)	100C to 500C	5mV	54
Pt13% Rh/Pt R	(1)	0C to 1600C	600C	05	Pyrometer IVD1	*(4)	1000C to 2500C	5mV	61
Pt10% Rh/Pt S	(1)	0C to 1600C	600C	06	Pyrometer DT1	*(4)	1200C to 2500C	5mV	62
Pt30% Rh/Pt6% Rh B	(1)	0C to 1800C	1000C	08	Pyrometer DT1/10	*(4)	1500C to 3000C	5mV	63
W/W 26% Re	(1)	0C to 2300C	450C	09	Pyrometer RO 23	*(4)	800C to 1700C	5mV	64
W5% Re/W 26%	(1)	0C to 2300C	500C	11	Pyrometer FP/GP 10	*(4)	500C to 900C	5mV	82
Ni Cr/Con E	(1)	0C to 780C	100C	12	Pyrometer FP/GP 11	*(4)	700C to 1300C	5mV	83
Pt10% Rh/Pt40% Rh	(1)	200C to 1800C	1000C	23	Pyrometer FP/GP 12	*(4)	1000C to 1850C	5mV	84
W5% Re/W 26% Re C	(1)	0C to 2300C	500C	24	Pyrometer FP/GP 20	*(4)	400C to 750C	5mV	85
Pt20% Rh/Pt40% Rh	(1)	0C to 2000C	1900C	25	Pyrometer FP/GP 21	*(4)	500C to 1100C	5mV	86
Platinel 11	(1)	0C to 1200C	150C	28	Linear	(3)	-9000 to 19999	•	00
W/W 26% Re	(1)	0C to 2200C	500C	29	Sq. root	(3)		•	92
Ni/Ni 18% Molybdenum	(1)	0C to 1100C	600C	33					
W3% Re/W 25% Re D	(1)	0C to 2400C	1000C	35					
W/Re 5% W/Re 26%	(1)	0C to 2000C	1000C	38					
Nicrosil/Nilil	(1)	0C to 1300C	150C	45					

• Note: For linear inputs sensitivity must not be less than 5µV/digit

Display Min/
Display Max

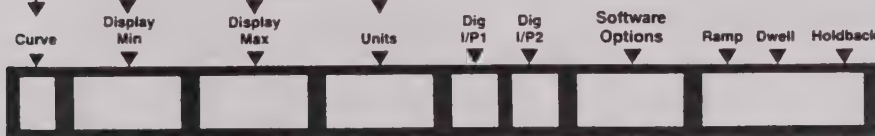
These should be selected from the recommended minimum and maximum ranges shown in Curve. Include decimal point position — This is especially important on linear range.

* Decimal points not available on these ranges.

Units

NONE
°C
°F
K
mV
V
mA
%
(Or specify up to 5 characters)

Note (1), (2), (3) and (4) refer to inputs



Option

Option	Code
Faston Terminal	FN
Screw Terminal	SN
Faston 24V ac/dc	FN24
Screw 24V ac/dc	SN24

Digital Inputs

	Dig I/P1	Dig I/P2
NONE	NO	NO
Auto Manual	AM	AM
Local Remote	LR	LR
Adaptive Tune	AT	—
Keylock	KL	—
Run/reset Prog.	RS	—
DIG I/P 1 up key	UK	—
DIG I/P 2 down key	—	DK
Parameter Security	PS	—
Self tune	—	ST
Ramp	—	RP
Run/Hold Programme	—	RH
Hold/Run Programme	—	HR
SP 2/SP 1**	S2	S2
Skip Segment	—	—
Programme	SS	SS
Step Programme	—	SP
number	—	—
PID2/PID1,	—	P2

* These options must be selected together. If selected no other input is possible.

** Not available with remote trim

Software Options

Function	Code
Manual Key Enabled	E
Manual Key Disabled	D

Function	Code
Cold Junction	
Non T/C Input	N
Internal Compensation	IN
External 0°C Ref	0
External 45°C Ref	45
External 50°C Ref	50

Function	Code
Integral and Derivative in Secs	S
Integral and Derivative in Mins	M
Integral and Derivative in Secs with dual PID	SS
Integral and Derivative in Mins with dual PID	MM

Function	Code
Power Feedback	P
No Power Feedback	• N

• Not available on dc or VP outputs therefore enter N.

Programmer 818P

All other models end code with software options.

Ramp Scale/Dwell Scale

Ramp Scale	Code
SP units per minute	MN
SP units per hour	HR
Time to target mins	MT
Time to target hours	HT

Dwell Scale	Code
Dwell in minutes	MN
Dwell in hours	HR

Alarm Relays Driven from Programmer Segments

If alarm 1 and or alarm 2 and or output 2 are not required as alarms, retransmission or control, their output stages can be driven from the segments of the programme. For this feature enter 'PROG' into the required field, (output 2, alarm 1 or alarm 2).

Holdback	Code
No Holdback	N
Band deviation holdback	H
High deviation holdback	U
Low deviation holdback	L

Note:

For high resolution ramp rate suffix code H, giving HH, UH or LH

Chapter 4.0 Configuration

The 818 controller is microprocessor based and therefore most of the changes to the input, outputs, alarms and options are performed in software (configuration). Some of these software changes are also accompanied by hardware (printed circuit board or switch link) changes. Changes to the configuration are under the security of a hardware switch. However, the configuration can be read without operating the switch and whilst the instrument is still controlling.

To enter the 'read only mode' of the configuration, scroll down through the long scroll until the mnemonic "Sbr" appears on the display. With the 'scroll' button still depressed also depress the 'down' button. The first of the configuration mnemonic "CI" will appear on the lower display. To reveal the numerical value of "CI" depress either the 'up' or 'down' button.

The scroll button will index through the configuration mnemonics. Use the 'up' or 'down' button to reveal the numerical value of any mnemonic.

Values or mnemonics in the configuration list will time out in the same way as the long scroll.

A complete list of the configuration mnemonics with their function is given below.

MNEMONIC	FUNCTION
C1	Input, CJC, units and ti+td times
C2	VP, PID or on/off, outputs and power feedback
C3	Alarm definitions
C4	Digital inputs, ADC and security definition
C5	Communications
C6	Controller options
C7	Communications type and input output
C8	Programmer options
idn	Output hardware definition
dsL	Low limit of display range
dsh	High limit of display range
SPL	Low limit of main setpoint
SPh	High limit of main setpoint
S2L	Low limit of second setpoint
S2h	High limit of second setpoint
Ah1	Alarm hysteresis AL1
Ah2	Alarm hysteresis AL2
Add	Instrument address
C1L	Low calibration of output 1 when analogue
C1h	High calibration of output 1 when analogue
C2L	Low calibration of output 2 when analogue
C2h	High calibration of output 2 when analogue
C3L	Low calibration of output 3 (alarm 1) when analogue retransmission.
C3h	High calibration of output 3 (alarm 1) when analogue retransmission.
r0L	Low calibration of analogue comms output
r0h	High calibration of analogue comms output
rL	Low limit of retransmission output (Eng units)
rH	High limit of retransmission output (Eng units)
rL	Low limit of remote analogue input (Eng units)
rH	High limit of remote analogue input (Eng units)

MNEMONIC

FUNCTION

i8*

i20*

i50*

tr*

cJc*

rtL*

rth*

lcL*

lch*

PcL*

Pch*

CLr*

These parameters are associated with calibration and no attempt should be made to alter them without first referring to chapter 7.0.

Motor position potentiometer
input calibration (VP only)
clears error flags and sets system

*These mnemonics above are not included in the read only configuration scroll list.

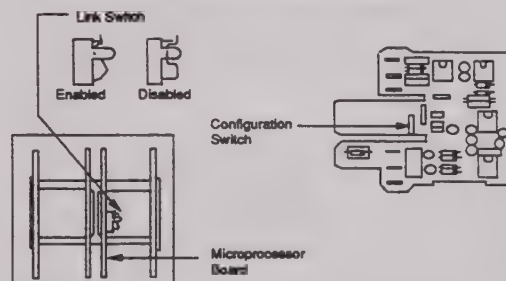
Functions which are only available with specific versions of software are indicated by the following key.

 	2.05 and below
 	2.07 and above
 	3.11 and above
 	4.11 and above

4.1 Configuration Changes (General Operating Procedure)

To change the configuration of an instrument it is essential that the following procedure is followed exactly. If in any doubt, contact your local Eurotherm engineer.

1. Switch off power to the instrument and remove it from its sleeve.
2. Enable the configuration switch as shown



Note:-

This operation can be simplified by using a configuration key, part no. JB022111, in which case it is not necessary to remove the instrument from its sleeve, only to turn the power off while the key is being inserted.

3. Return the instrument to its sleeve and switch on the power.

Note:-

In this mode the instrument no longer controls, the control outputs are disabled.

4.3 To Change the Display range, Decimal point or Sensor type

Hardware

No changes are required within the instrument when changing the display range, decimal point or sensor type.

If the display units are to be changed, the label in the top right-hand corner of the bezel should be changed. (Strip of display unit labels. Part No. GA021836.)

Instruments with milli-amps, pyrometer or voltages greater than 50mV into the main input, terminals 25 and 26, are fitted with an extra block mounted onto the rear of the sleeve.

The part numbers of these blocks are given below:

Input into rear terminals	Part no. of Block
0-5 volts or 1-5 volts	LA021419U006
0-10 volts or 2-10 volts	LA021419U005
0-20 mA or 4-20 mA	LA021419U003
Optical Pyrometer Q004 or Q003	LA021419U004
Optical Pyrometer IVD1, DT1, DT1/10, FP/GP10, FP/GP11	LA021419U005
FP/GP12, FP/GP20, FP/GP21	

All other pyrometer, thermocouple, resistance thermometer or linear inputs have the input wired directly to the sleeve terminals.

Note:-

For the above changes it is NOT necessary to scroll through the configuration list to "idn" and enter this change

Software

Sensor Type.

1. Carry out the procedure in paragraph 4.1, changing mnemonic, "C1", character 'C' and 'D', as given in the table below.

C1 (C & D)

CD	= 00 J	(01)
	= 01 JDIN	(02)
	= 02 K	(03)
	= 03 T	(04)
	= 04 R	(05)
	= 05 S	(06)
	= 06 B	(08)
	= 07 W/W26ENG	(09)
	= 08 W5/W26ENG	(11)
	= 09 E	(12)
	= 10 P10/40RHS	(23)
	= 11 C	(24)
	= 12 R20/40RH	(25)
	= 13 Platine1 11	(28)
	= 14 W/W26%Re	(29)
	= 15 Ni/Ni-18% Moly	(33)
	= 16 W3/W25HER	(35)
	= 17 W5/W26BOC	(38)
	= 18 Nisil	(45)

C1 (C & D)(continued)

CD	= 19 Q009 (46)DT1	(62)
	= 20 Q002 (50)DT1/10	(63)
	= 21 Q003	(51)
	= 22 Q005 (57)R023	(64)
	= 23 Q007 (58)R026 or ORK35-2-3	(54)
	= 24 Q004	(48)
	= 25 RT100	(70)
	= 26 Linear to 8mV	
	= 27 Linear to 20mV	
	= 28 Linear to 50 mV	
	= 29 Linear to 8mV(20%offset)	
	= 30 Linear to 20mV(20% Offset)	
	= 31 Linear to 50mV (20% offset)	
	= 32 Square root	(92)
	= 33 Square root (20% offset)	(92)
	= 34 Linear- 8 to 8mV	
	= 35 IVD1	(61)
	= 36 FP/GP 10	(82)
	= 37 FP/GP 11	(83)
	= 38 FP/GP 12	(84)
	= 39 FP/GP 20	(85)
	= 40 FP/GP21	(86)

Numbers in brackets are Eurotherm input code.

Note if pyrometer inputs are configured, ensure that after leaving config, the emissivity (ES in long scroll list) is set to 1.00 or a suitable value.

2. For ranges using a thermocouple as a sensor the cold junction compensation must be selected by setting character "A" of mnemonic "C1" as follows.

C1(A)

A	= 0 Internal CJC Cal Trim (μV)
	= 1 External 0°C Cal Trim (μV)
	= 2 External 45°C Cal Trim (μV)
	= 3 External 50°C Cal Trim (μV)
	= 4 Internal CJC PV Offset (Eng Units)
	= 5 External 0°C PV Offset (Eng Units)
	= 6 External 45°C PV Offset (Eng Units)
	= 7 External 50°C PV Offset (Eng Units)

Note:-

For all non thermocouple inputs any value of "A" may be set. Only CAL TRIM is set by this character.

3. Ranges using either thermocouples, resistance thermometers or pyrometers, as sensors must have the display units set by mnemonic 'C1' character 'B' as follows:-

CI (B)

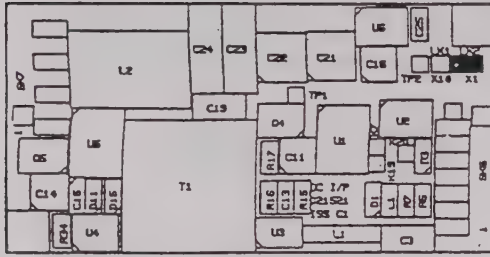
B	= 0 °C ti and td in secs
	= 1 °F ti and td in secs
	= 2 °K ti and td in secs
	= 3 °C ti and td in mins
	= 4 °F ti and td in mins
	= 5 °K ti and td in mins

Note:-

For all other inputs the setting of 'B' has no significance except for setting the integral and derivative times.

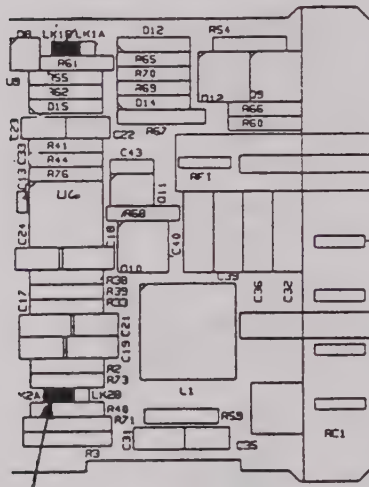
Software Key

	2.05 and below
	2.07 and above
	3.11 and above
	4.11 and above



Select link 2 for a maximum span of 10 volts

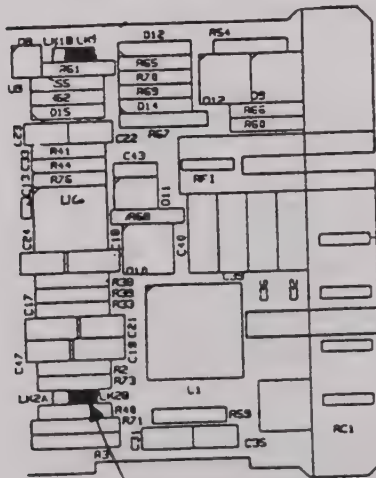
ANALOGUE COMMUNICATIONS BOARD Max 10V input



Select LKB
and LKA
for High
Voltage Input
(maximum
span of 10
volts lying
between -5.0
and +10.0
volts).

Max range of 10 volts Input
lying between -5.0 to 10.0 volts
(Remote Setpoint)

Max 1V input



Select LKA
and LKB
for High
Voltage Input
(maximum
span of 10
volts lying
between -5.0
and +1.0
volts).

Max range of 1.0 volts Input
lying between -0.5 to +1.0 volts
(Remote Setpoint)

The other hardware change that may have to be made is the inclusion of the 50 ohm resistor across the rear terminals if the remote input is a 20mA current signal.
The part number of this resistor assembly is given below:-

Instrument	Part Number of Resistor Assy.
With Screw Terminals	CA06650R
With fasten terminals	AH021618U002

Software

Using the procedure in paragraph 4.1

- C3(C)** Scroll to mnemonic 'C3' character 'C' and set to 'O' if a d.c. remote input board is plugged into alarm 2 position.
- C7(D)** Scroll to mnemonic 'C7' character 'D' and set to 'I' if an analogue communications board is plugged into the communications board position.
- C5(B)** Scroll to mnemonic 'C5' character 'B' and set to the type of remote setpoint required as shown in the table below:-

Remote Analogue Input and Second Setpoint

C5(B)		
B.	= 0 No Remote	SP2 available
	= 1 Remote+Local SP (LSP)(Front/Rear)	SP2 Not available
	= 2 Remote+Local SP (LSP)(Rear Only)	SP2 Not available
	= 3 Remote only (front/rear)	SP2 available
	= 4 Remote only (rear only)	SP2 available
	= 5 Output power limit (heat)(rear only)	SP2 available
	= 6 Output power limit (cool)(Rear Only)	SP2 available

Note:-

Setting a '1' or '2' gives a working setpoint of the remote signal plus the local setpoint LSP

Setting a '3' or '4' gives a working setpoint of the remote signal only.

A '5' or '6' set uses the remote signal to set the output power limit either in the heat or cool channel.

The mnemonics 'icL' and 'ich' calibrate the incoming analogue signal. This procedure is covered in the calibration section (see paragraph 7.5).

icL ich

During this procedure the calibration points are displayed as a percentage of either 1 or 10 volts depending on the setting of the links in paragraph 4.5. The range of this display is 0-100% for a d.c. remote input board and -50 to +100% for the analogue communications board.

Note:-

If standard 20% offsets i.e. 1-5 volts, 2-10 volts, 4-20mA or 2-10mA are set using the procedure in (iv) above, no detection of an open circuit input (zero milliamps or volts) is provided.

Software Key

	2.05 and below
	2.07 and above
	3.11 and above
	4.11 and above

Note:-

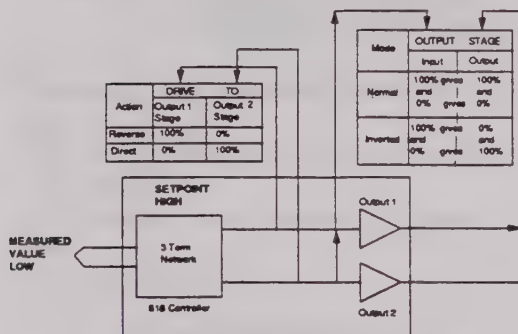
Setting '0' or '2' ensures that output 1 is driven by the heat signal and output 2 is driven by the cool signal. Selecting a '1' or a '3' ensures that both output 1 and output 2 are driven with the heat signal and the cool signal is not used.

- C2(B)** = 0 No power feedback, reverse acting
 = 1 Power feedback, reverse acting
 = 2 No power feedback, direct acting
 = 3 Power feedback, direct acting.

Note:-

Setting a '0' or '1' gives reverse acting whilst a '2' or '3' gives direct acting as shown in the diagram.

Explanation of Normal/Inverted and Direct/Reverse

**Note:-**

Setting a '0' or a '2' will give Power feedback on output 1, the heat output. Power feedback is not operative for valve positioner instruments and dc outputs.

- C2(C)** = 0 Output 1- normal, output 2-normal (P.I.D.)
 = 1 Output 1- normal, output 2-inverted (P.I.D.)
 = 2 Output 1- raise,, output 2 -lower (VP)
 = 3 Output 1- inverted, output 2- normal (P.I.D.)
 = 4 Output 1- lower, output 2 - raise (VP)
 = 5 Output 1- inverted, output 2inverted (P.I.D.)
 = 6 Output 1- lower, output 2 raise (VP)
 = 7 Output 1- raise, output 2- lower, asymmetric valve (VP)
 = 8 Output 1- lower, output 2- raise asymmetric valve (VP)

Note:-

This character sets the normal or inverted output as shown in the diagram above. On the valve position versions of software it sets the raise and lower outputs.

- C2(D)** = 0 PID heat no cool
 = 1 PID heat PID cool (LINEAR)
 = 2 PID heat PID cool (NONLINEAR)
 = 3 PID heat ON/OFF cool
 = 4 ON/OFF heat ON/OFF cool
 = 5 ON/OFF heat no cool
 = 6 Valve positioner
 = 7 Valve positioner with position pot.
 = 8 PID heat Or P2 dig out. Control by programme

Note:-

Character 'D' sets each output channel to either give On/Off or PID control. The (NON-LINEAR) PID cool should be used on water cooling systems where the water is likely to be flashed 'off' to steam. For all other cooling systems the LINEAR version should be used.

Note:-

Setting a '6' or '7' on a non valve positioner version of the instrument will cause the error display 'C2E' to appear.

- C1L, C1h, C2L, C2h** Scroll onto the mnemonics 'C1L', 'C1h', 'C2L' and 'C2h' which are used for the calibration of dc outputs.

Note:-

For output 2 (cool) use parameter in brackets. Scroll to 'C1L' ('C2L') and set the value to represent the minimum output as follows:-
 0% for 0mA or 0 Volts
 20% for 4mA or 2 Volts etc.
 Scroll to 'C1h' ('C2h') and set the value to represent the maximum output as follows:-
 50% for 10mA or 5 Volts
 100% for 20mA or 10 Volts etc.

The actual % output used can be adjusted about these nominal values to give a more accurate setting, by monitoring the output with a D.V.M. and adjusting the value required with the 'up' and 'down' buttons.

Note:-

With non-d.c. output stages fitted the value set in these mnemonics is ignored by the instrument. Refer also to:-
 Section 4.7 Valve positioner
 Section 4.9 Retransmission

4.7 To Change the Valve Position Output

Hardware

Two versions of valve positioner controller exist. One uses a potentiometer driven by the valve motor to indicate valve position and stop the drive to the motor before the motor micro switches operate. The other does not use the feedback potentiometer at all.

The version without the position potentiometer uses the same hardware as the P.I.D. version of the controller. When using the position potentiometer a different version of the options board must be fitted. This plugs into the options position on the mother board and has sites for only two modules; one output and one alarm (alarm 1). The correct output modules must then be plugged into the output sites. A change of option board even though the output and alarm modules are the same necessitates performing the routine outlined in paragraph 4.2; namely, scroll to 'ldn' and press the 'up' and 'down' buttons. Then scroll to 'CLR' and again press the 'up' and 'down' buttons.

Note:-

Eurotherm part numbers for the options boards and output modules can be found in chapter 8.

Software Key

- 2.05 and below
 2.07 and above
 3.11 and above
 4.11 and above

Software

Carry out the procedure outlined in paragraph 4.1 scrolling to mnemonic 'C3' and setting characters B and C to the value indicated in the table below. Character B defines alarm 1 and character C defines alarm 2.

C3 (B or C)	= 0	No alarm (retransmission possible on channel 3 or remote input possible on channel 4).
	= 1	DH (Deviation High)
	= 2	DL (Deviation Low)
	= 3	DB (Deviation Band)
	= 4	FSH (Full Scale High)
	= 5	FSL (Full Scale Low)
	= 6	Digital output (Programme Segment drive) 818P/4/15 only
	= 7	Digital output, control via comms

Note :-

Setting a 0 or 6 for these characters will disable the alarm.

Note :-

Setting a '6' gives drives to the alarm relays from segments of the programme.

Set also character 'D' of 'C3' as shown in the following table:-

Alarm Relay States

C3(D)	
D.	= 0 A1 and A2 de-energised in alarm.
	= 1 A1 de-energised, A2 energised in alarm.
	= 2 A1 energised, A2 de-energised in alarm.
	= 3 A1 and A2 energised in alarm.

Note:-

If '0' or '6' is set for C3 (B or C) then the value given in C3D is ignored by the controller.

Ah1 Set mnemonics 'Ah1' and 'Ah2' to the hysteresis of alarm 1 and alarm 2 respectively. These mnemonics have a range of 0.1 to 10% of the display range.

Refer also to :-

Section 4.9 Retransmission

Section 4.5 Remote input

Section 4.12 Security

4.9. To Change a Retransmission Output

Hardware

One retransmission output only may be obtained from the instrument. This output is available from either:-

- Output 2 (Cool)
- or Output 3 (Alarm 1)
- or The analogue communication board.

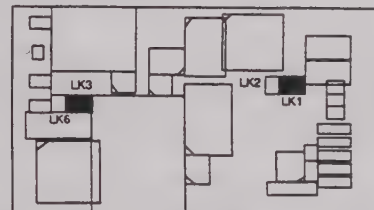
- i) For retransmission signals from output 2 or 3, fit a d.c. retransmission output module into the relevant site.

Note:-

Eurotherm part numbers of the output modules are given in chapter 8.0.

Set the links on this board to give the type of output required i.e. current or voltage, as diagram below.

D.C. OUTPUT (RETRANSMISSION) BOARD



Position of links for current output



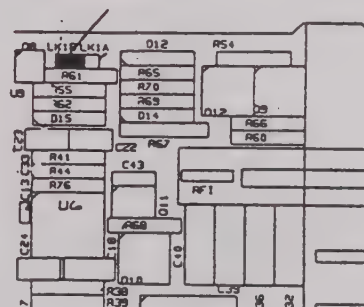
Position of links for voltage output

If the analogue communications board (Part No. SUB-SPARE-ANALG-COMM-BOARD) is to be used for retransmission this must be plugged into the communication board position.

Set the links on this board to give the output required either current or voltage as shown.

ANALOGUE COMMUNICATIONS BOARD

Voltage Output (Retransmission)



Link position for voltage output

Software Key

	2.05 and below
	2.07 and above
	3.11 and above
	4.11 and above

4.10 To Change the Digital Inputs

Hardware

No hardware changes are required to change or implement this function.

Software

Carry out the procedure given in section 4.1 changing the mnemonics 'C4' characters 'A', 'C' and 'D' as shown in the table below:-

Supply Frequency and Digital Input 2

C4(A)	= 0	50 ± 2Hz and 60 ± 0.3Hz
	= 1	60 ± 2Hz
	= 2	50 ± 2Hz and dig in 2 = PID 2 / PID 1
	= 3	60 ± 2Hz and dig in 2 = PID 2 / PID 1
	= 4	50 ± 2Hz and dig in 2 = Prog no. monitor/ step
	= 5	60 ± 2Hz and dig in 2 = Prog no. monitor/ step

For C4(A) = 2, 3, 4 or 5 it is necessary to set C4(C) = 9.

Digital Input 2

C4(C)	= 0	none
	= 1	auto/manual
	= 2	remote analogue input enable
	= 3	self tune
	= 4	ramp function
	= 5	run/hold (programmer 818P/4/15 only)
	= 6	hold/run (programmer 818P/4/15 only)
	= 7	second setpoint
	= 8	skip Current Segment. (programmer 818P/4/15 only)
	= 9	Refer to digit (A)

Digital Input 1

C4(D)	= 0	none
	= 1	auto/manual
	= 2	remote analogue input enable
	= 3	adaptive tune
	= 4	keylock
	= 5	run/reset (programmer 818P/4/15 only)
	= 6	digital input 1 - up key digital input 2 - down key (C4(C) ignored)
	= 7	parameter modification security
	= 8	skip Current Segments(programmer 818P/4/15 only)
	= 9	Second Setpoint.

Note:-

In versions previous to 4.11, C4(D) = 5 has the function reset only.

Refer also to:-

- Section 4.17 Second Setpoint
- Section 4.5 Remote Input
- Section 4.12 Security
- Section 4.14 Normal and Fast self tune
- Section 4.15 Ramp
- Section 4.16 Programming

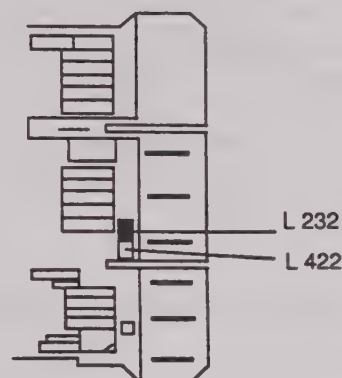
4.11 To Change the Digital Communications

Hardware

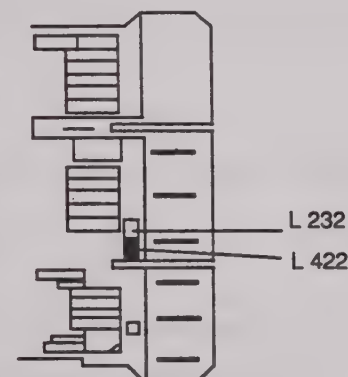
Carry out the procedure as in section 4.2 to install the digital communications board Eurotherm part no. SUB-SPARE-DIGCOMM-BOARD. This is plugged into the communications board position on the mother board.

The link on the back of the digital communications board should be set to the communications standard, RS232 or RS422/485 as shown in the diagram below:-

DIGITAL COMMUNICATIONS BOARD



Link position for RS 232 communications



Link position for RS 422/485 communications

Software Key

- 2.05 and below
- 2.07 and above
- 3.11 and above
- 4.11 and above

SELF AND ADAPTIVE TUNE

- C7(B) = 0 neither available
 = 1 St and At available front and rear
 = 2 St front and rear, At rear only
 = 3 At front and rear, St rear only
 = 4 St and At rear only
 = 5 Fast St and At available front and rear
 = 6 Fast St front and rear At rear only
 = 7 At front and rear fast St rear only
 = 8 Fast St and At rear only

Normal
tune on
instruments
with
cool
channel

The 'run/hold' button to operate the ramp facility can be disabled by setting mnemonic 'C8' character 'C' as shown below:-

RUN/HOLD, SELECTION

- C8(C) = 0 run/hold front/rear
 = 1 run/hold rear only

The 'run/hold' button and the 'reset' feature, i.e. depressing both the 'up' and 'down' buttons, can be disabled on the 818P by setting the mnemonic 'C8' character 'C' as shown below:-

RUN/HOLD, RESET, SELECTION

- C8(C) = 0 run/hold front/rear (reset front/rear)
 = 1 run/hold rear only (reset front/rear)
 = 2 run/hold front/rear (reset rear only)
 = 3 run/hold rear only (reset rear only)

Refer also to:-

- Section 4.5 Remote input
- Section 4.10 Digital inputs
- Section 4.14 Normal and Fast self tune
- Section 4.15 Ramps
- Section 4.16 Programming

4.13 To Change the Track/Hold Facility

Hardware

No hardware changes are required to modify this feature.

Software

Carry out the procedure in section 4.1 to amend the following mnemonics:-

The value of the mnemonic 'C6' character 'C' sets the track or hold facility for both auto/manual and local/remote as shown below:-

SETPOINT TRACK MODE

- C6(C) = 0 while in remote SP, hold SP1
 while in manual, hold working SP
 = 1 while in remote SP, hold SP1
 while in manual, working setpoint tracks PV
 = 2 while in remote SP, SP1 tracks working SP
 while in manual, hold working setpoint
 = 3 while in remote SP, SP1 tracks working SP
 while in manual, working setpoint tracks PV

4.14 To Change from Normal to Fast Self Tune

Hardware

No hardware changes are required to modify this feature.

Software

Carry out the procedure in section 4.1 to amend the following mnemonics:-
 Set the mnemonic 'C7' character 'B' to a value shown below:-

SELF AND ADAPTIVE TUNE

- C7(B) = 0 neither available
 = 1 St and At available front and rear
 = 2 St front and rear, At rear only
 = 3 At front and rear, St rear only
 = 4 St and At rear only

- = 5 Fast St and At available front and rear
 = 6 Fast St front and rear, At rear only
 = 7 At front and rear, fast St rear only
 = 8 Fast St and At rear only

Normal tune
on instruments
with cool
channel

4.15 To Change the Ramp Function

Hardware

No hardware changes are required to modify this feature.

Software

Carry out the procedure in section 4.1 to amend the following mnemonics:-

The value of mnemonic 'C8' character 'B' should be set as below to specify the ramp rate in display units per minute or per hour.

SEGMENT TIMES

- C8(B) = 0 ramp in minutes
 = 1 ramp in hours

The value of mnemonic 'C8' character 'D' should be set as below:-

CONTROLLER ACTION

- C8(D) = 0 no ramp function
 = 1 ramp function

The value of mnemonic 'C8' character 'A' must be set to '0'.

Refer also to section 4.10 Digital Inputs.

Software Key

- ☐ 2.05 and below
☐ 2.07 and above
☐ 3.11 and above
☐ 4.11 and above

4.19 To Change the Integral and Derivative Terms

Hardware

No hardware changes are necessary to modify this feature.

Software

Carry out the procedure in section 4.1 to amend the following mnemonics:-

Set the mnemonics 'C1' character 'B' as shown below:-

C1(B)	= 0	'°C' ti and td in secs
	= 1	'°F' ti and td in secs
	= 2	'K' ti and td in secs
	= 3	'°C' ti and td in mins
	= 4	'°F' ti and td in mins
	= 5	'K' ti and td in mins

Set the mnemonic 'C2' character 'A' as shown below:-

C2(A)	= 0	output 1 and output 2 separate	Derivative driven by error signal
	= 1	output 2 takes same PID/manual o/p as output 1	
	= 2	output 1 and 2 separate	Derivative driven by process variable
	= 3	output 2 equals output 1	

4.20 To Change Units of Calibration Trim

Hardware

No hardware changes are necessary to modify this feature

Software

Carry out the procedure in section 4.1 to amend the following mnemonics:-

Set the mnemonic 'C1' character 'A' as shown below:-

C1(A)	= 0	internal CJC	(Cal trim in μ V)
	= 1	external 0°C	
	= 2	external 45°C	
	= 3	external 50°C	
	= 4	internal CJC	(Cal trim in eng. units)
	= 5	external 0°C	
	= 6	external 45°C	
	= 7	external 50°C	

4.21 To Change Bandwidth of the Measured Value Input Filter

Hardware

No hardware changes are necessary to modify this feature.

Software

Carry out the procedure in section 4.1 to amend the following mnemonics:-

Set mnemonic 'C4' character 'A' as shown below:-

Supply Frequency and Digital Input 2

C4(A)	= 0	50 $\pm$ 2Hz and 60 $\pm$ 0.3Hz
	= 1	60 $\pm$ 2Hz
	= 2	50 $\pm$ 2Hz and dig in 2 = PID 2 / PID 1
	= 3	60 $\pm$ 2Hz and dig in 2 = PID 2 / PID 1
	= 4	50 $\pm$ 2Hz and dig in 2 = Prog no. monitor/step
	= 5	60 $\pm$ 2Hz and dig in 2 = Prog no. monitor/step

For C4(A) = 2, 3, 4 or 5 it is necessary to set C4(C) = 9.

4.22 To Change Dual PID Facility

This facility, when configured, gives a second set of commissioning parameters. (Pb2, ti2, rs2, td2, Cr2 and AP2 as applicable).

Hardware

No hardware changes are necessary to modify this feature.

Software

Note this facility is only available in instruments fitted with software 3.11 and above and is protected by a security code. Use the configuration procedure outlined in chapter 4.1 to change the following mnemonics and select dual commissioning parameters.

Set the mnemonic 'C3' character 'A' as shown below:-

Proportional Band

C3(A)	= 0	prop band in percent	Single set of commissioning parameters
	= 1	prop band in display units	
	= 2	prop band in percent	Dual set of commissioning parameters
	= 3	prop band in display units	

Normally the second set of commissioning parameters is selected simultaneously when selecting second setpoint. This is achieved either via digital communications, or by configuring digital inputs.

The active setpoint may be selected by digit A, bit 13 of the Status Word (SW). (see chapter 5.0)

The active setpoint may also be selected with a digital input by configuring C4;

C4 (D) = 9 to select second setpoint with Dig in 1 or
C4 (C) = 7 to select second setpoint with Dig in 2.
(see 4.10)

Software Key

 	2.05 and below
 	2.07 and above
 	3.11 and above
 	4.11 and above

Chapter 5.0

Configuration Parameters and their Ranges

5.0 CONFIGURATION PARAMETERS AND THEIR RANGES

C1

INPUTS AND UNITS (C1) = 'ABCD'

(A)	=	0	internal CJC	CAL TRIM IN μ V's	C.J.C. and Trim
	=	1	external 0°C		
	=	2	external 45°C		
	=	3	external 50°C	CAL TRIM IN ENG UNITS	
	=	4	internal CJC		
	=	5	external 0°C		
	=	6	external 45°C		
	=	7	external 50°C		

(B)	=	0	"C" ti and td in secs	UNITS
	=	1	"F" ti and td in secs	
	=	2	"K" ti and td in secs	
	=	3	"C" ti and td in mins	
	=	4	"F" ti and td in mins	
	=	5	"K" ti and td in mins	

(CD)	=	00	J	(01)	INPUT TYPE
	=	01	J DIN	(02)	
	=	02	K	(03)	
	=	03	T	(04)	
	=	04	R	(05)	
	=	05	S	(06)	
	=	06	B	(08)	
	=	07	W/W26ENG	(09)	
	=	08	W5/W26ENG	(11)	
	=	09	E	(12)	
	=	10	P10/40RHS	(23)	
	=	11	C	(24)	
	=	12	R20/40RH	(25)	
	=	13	Platine1 11	(28)	
	=	14	W/W26%Re	(29)	
	=	15	Ni/Ni8%Moly	(33)	
	=	16	W3/W25HER	(35)	
	=	17	W5/W26BOC	(38)	
	=	18	Nisil	(45)	
	=	19	Q009	(46)	DT1 (82)
	=	20	Q002	(50)	DT1/Z1680 (63)
	=	21	Q003	(51)	
	=	22	Q005	(57)	RO23 (64)
	=	23	Q007	(58)	RO26 or K 35-2-3 (54)
	=	24	Q004	(48)	
	=	25	RT100	(70)	
	=	26	linear to 8mV		
	=	27	linear to 20mV		
	=	28	linear to 50mV		
	=	29	linear to 8mV(20% offset)		
	=	30	linear to 20mV(20% offset)		
	=	31	linear to 50mV(20% offset)		
	=	32	square root	(92)	
	=	33	square root (20% offset)	(92)	
	=	34	linear - 8 tp + 8mV		
	=	35	IVD1	(61)	
	=	36	FP/GP 10	(82)	
	=	37	FP/GP 11	(83)	
	=	38	FP/GP 12	(84)	
	=	39	FP/GP 20	(85)	
	=	40	FP/GP 21	(86)	

Eurotherm input code (XX)

C2

PID AND OUTPUTS (C2) = 'ABCD'

(A)	=	0	output 1 and output 2 separate	] derivative error driven
	=	1	output 2 equals output 1*	
	=	2	output 1 and output 2 separate	] derivative PV driven
	=	3	output 2 equals output 1*	

* Not available on V.P. version

(B)	=	0	no power feedback reverse acting
	=	1	power feedback reverse acting
	=	2	no power feedback direct acting
	=	3	power feedback direct acting
(C)	=	0	output 1- normal output 2- normal (PID) <i>output 1- raise, output 2- lower</i>
	=	1	output 1- normal output 2- inverted (PID) <i>output 1- raise, output 2- lower</i>
	=	2	output 1- inverted output 2- normal (PID) <i>output 1- lower, output 2- raise</i>
	=	3	output 1- inverted output 2- inverted (PID) <i>output 1- lower, output 2- raise</i>
	=	4	output 1 - raise, output 2 - lower <i>assymmetric valve</i>
	=	5	output 1 - lower, output 2 raise <i>assymmetric valve</i>
(D)	=	0	PID heat no cool
	=	1	PID heat PID cool (linear)
	=	2	PID heat PID cool (non-linear)
	=	3	PID heat ON/OFF cool
	=	4	ON/OFF heat ON/OFF cool
	=	5	ON/OFF heat no cool
	=	6	<i>valve positioner</i>
	=	7	<i>valve positioner with position potentiometer</i>
	=	8	PID heat OP 2 dig out. Control via prog.

C5**COMMUNICATIONS (C5) = 'ABCD'****Digital Comms Speed**

- (A) = 0 9600 baud
 = 1 4800 baud
 = 2 3600 baud
 = 3 2400 baud
 = 4 1200 baud
 = 5 600 baud
 = 6 300 baud

Remote Analogue Input and Second Setpoint

- (B) = 0 no remote SP2 available
 = 1 remote + local setpoint (LSP)(front/rear) SP2 not available
 = 2 remote + local setpoint (LSP)(rear only) SP2 not available
 = 3 remote only(front/rear) SP2 available
 = 4 remote only (rear only) SP2 available
 = 5 output power limit (heat)(rear only) SP2 available
 = 6 output power limit (cool)(rear only) SP2 available

Sets the configuration of the input to the analogue communications or 'outputs' 2 or 3.

Analogue Retransmission

- (C) = 0 none
 = 1 setpoint
 = 2 PV
 = 3 error
 = 4 output power
 = 5 inverted setpoint
 = 6 inverted PV
 = 7 inverted error
 = 8 inverted output power

Sets the function of the retransmission signal from either the analogue communication board or 'outputs' 2 or 3.

Remote Analogue Input Offset

- (D) = 0 analogue input without offset
 = 1 analogue input with 20% offset

C6**CONTROLLER OPERATION (C6) = 'ABCD'****Decimal Point Position**

- (A) = 0 XXXXX pyrometer } T/C or } linear
 = 1 XXXX.X RT } or
 = 2 XXX.XX } square
 = 3 XX.XXX } root

Sets the decimal point position for both upper and lower displays

Auto Manual Selection

- (B) = 0 no manual
 = 1 manual front/rear
 = 2 manual rear only

Setpoint Track Mode

- (C) = 0 while in remote SP, hold SP1
 while in manual, hold working SP
 = 1 while in remote SP, hold SP1
 while in manual, working SP tracks PV
 = 2 while in remote SP, SP1 tracks working SP
 while in manual, hold working SP
 = 3 while in remote SP, SP1 track working SP
 while in manual, working setpoint tracks PV

Sets the value of the working setpoint when the instrument is switched to manual and also the value of SP1 when switched to remote. These setpoints can either remain at the value manually entered (HOLD) or take the value of the working setpoint or the measured value (PV).

Communications Type

- (D) = 0 Ascii Bi-Synch communication

= 1	Modbus	no parity	integer only
= 2	J-Bus	no parity	integer only
= 3	Modbus	even parity	integer only
= 4	J-Bus	even parity	integer only
= 5	Modbus	no parity	full resolution
= 6	J-Bus	no parity	full resolution
= 7	Modbus	even parity	full resolution
= 8	J-Bus	even parity	full resolution

Software Key

- ☐ 2.05 and below
☐ 2.07 and above
☐ 3.11 and above
☐ 4.11 and above

RANGE LIMITS

Mnemonic	Function	Default values when shipped from factory	Comments											
dSL dSh	= display low limit = display high limit		Used to define the maximum operational span of the instrument. Maximum range - 9999 to 19999 Thermocouple, RT and Pyrometer inputs are limited to the working range of the selected input type (see Section 3.0).											
SPL SPh	= setpoint 1 / working setpoint low limit = setpoint 1 / working setpoint high limit	SPL = dSL SPh = dSh	Used to define the maximum operational span of the effective instrument setpoint. Maximum range -9999 to 19999											
S2L S2h	= setpoint 2 low limit = setpoint 2 high limit	<table><tr><td>Standard</td><td>Local Trim</td></tr><tr><td>S2L = dSL</td><td>- 10% dSh</td></tr><tr><td>S2h = dSh</td><td>+ 10% dSh</td></tr></table>	Standard	Local Trim	S2L = dSL	- 10% dSh	S2h = dSh	+ 10% dSh	Used to define the maximum operational span of the second setpoint parameter. Maximum range - 9999 to 19999.					
Standard	Local Trim													
S2L = dSL	- 10% dSh													
S2h = dSh	+ 10% dSh													
Ah1 Ah2	= alarm 1 hysteresis = alarm 2 hysteresis	= 0.1%	Used to define the level of hysteresis to be employed for each of the two possible alarms. Maximum range 0.1 to 10% of input range.											
Add	= communications address	= 0.0	Instrument identifier used in conjunction with digital comms. Range 00 to 99.											
c1L c1h c2L c2h c3L c3h	= output 1 low calibration = output 1 high calibration = output 2 low calibration = output 2 high calibration = output 3 (alarm 1) low calibration = output 3 (alarm 1) high calibration		The hardware defines the maximum range of these outputs as 0-10 volts or 0-20mA. These hardware limits therefore define the limits of the software scalers for each output which is expressed as 0-100%. Calibration of the span and zero of retransmission outputs can be accomplished by fine tuning these parameters whilst observing the true output with a suitable digital meter. Example :- For a 0-5 volt output requirement set the high range scaler to 50% and the low range scaler to 0%. For a 4-20mA output requirement set the high range scaler to 100% and the low range scaler to 20%.											
rol roh	= retransmission low output calibration = retransmission high output calibration		Calibration of the output voltage/current as a percentage of 10 volts/20mA when retransmission is from the analogue comms board.											
rrL rrh	= retransmission low display scaler = retransmission high display scaler		Defines the display unit changes of the retransmission output.											
riL rih	= remote input low range scaler = remote input high range scaler	<table><tr><td rowspan="5">remote S/P+ local trim max power remote trim</td><td>ril</td><td>rih</td></tr><tr><td>display min</td><td>display max</td></tr><tr><td>0</td><td>100</td></tr><tr><td>-10%</td><td>+10%</td></tr><tr><td colspan="2">(of display range)</td></tr></table>	remote S/P+ local trim max power remote trim	ril	rih	display min	display max	0	100	-10%	+10%	(of display range)		Defines the change in the display units for the full change in the input voltage/current.
remote S/P+ local trim max power remote trim	ril	rih												
	display min	display max												
	0	100												
	-10%	+10%												
	(of display range)													
PdL Pch	= potentiometer low calibration = potentiometer high calibration	0% 100%												

Software Key

	2.05 and below
	2.07 and above
	3.11 and above
	4.11 and above

Chapter 6.0

Digital Communications

The 818 controller is designed to operate with either RS232 or RS422(485) digital communications. Many of the modes of operation that can be set by the push buttons on the front of the instruments or the digital inputs at the rear of the instrument can alternatively be activated by the digital communications link. Whilst the communications link is active a legend on the display will be illuminated. Access to the facilities, keylock and parameter modification, via digital communications can be disabled by closing a link on the microprocessor board (see 4.12). With the link open these facilities are available.

6.1 Communications Protocol

Three types of protocol are available on the 818 controller as shown below:-

- a) ASCII BI-SYNCH
- b) J-BUS® R.T.U.*
- c) MODBUS® RTU*

For the instruments that leave the factory configured for J-BUS® RTU and MODBUS® RTU a separate protocol booklet, part number HA02450, is included with the installation information.

For this reason only the ASCII BI-SYNCH communications system will be dealt with in this section.

* Only available on instruments fitted with version 3.11 software and above.

6.2 ASCII BI-SYNCH Communications Protocol

Message Structure

REQUEST FOR DATA

Host transmission

EOT	UNIT ADDRESS (1)	MNEMONIC	ENQ
-----	------------------	----------	-----

818 response

STX	MNEMONIC (2)	DATA (3)	ETX	BCC (4)
-----	--------------	----------	-----	---------

Host either repeats transmission message
or ACK (for polling mnemonics list)
or NAK (for repeat of mnemonic with latest value)

REQUEST TO CHANGE VALUES

Host transmission

EOT	UNIT ADDRESS (1)	STX	MNEMONIC	DATA (2)
ETX BCC (3)				

818 response either
ACK (Change has taken place)
or NAK (Change has been aborted)

Host either repeats transmission message
or for further changes in the same instrument:

STX	MNEMONIC	DATA (2)	ETX	BCC (3)
-----	----------	----------	-----	---------

Note (1) Unit Address

Four characters long, consisting of the instrument address, appearing under the configuration mnemonic 'Add', with each digit repeated. For example an instrument address of '53' would give a unit address of '5533'.

Note (2) Data Format

Five or six character are assigned to data. Data can be either free or fixed format set by bit, '0' of character 'D' of the status word 'SW'.

Fixed Format:-

In this format all 5 character position must be filled, and for negative values, the decimal point is replaced by a minus sign.

Therefore + 5.3 can be entered as :

(5.300)
(05.30)
or (005.3)

and -5.3 can be entered as :

(5-300)
(05-30)
(005-3)

This system has the advantage that you have the same resolution for positive and negative numbers.

Free Format:-

In this system all six character positions need not be filled. A negative number is designated by a negative sign in front of the number, a value of 13.9 can be entered in any of the following forms:-

(0013.9)
(13.9)
(13.90)
(13.9)

and -2 can be entered as:

(-2.0)
(-2.0)
(-2)
(-2.)
(-2)
(-02.00)
(-2.000)

Status Word Data:-

Again 5 character are used but the first character is always a 'S' sign to signify that the other 4 character in the data are hexadecimal.

Software Key

	2.05 and below
	2.07 and above
	3.11 and above
	4.11 and above

6.4 Status Words

Digits 'ABCD' are ASCII characters representing a hexadecimal digit (0-9, A-F).

Status Word (SW)

Format (> ABCD)

Digit	Bit	Function	Attribute	Clear / Set
D	0	Data format	R/W	Free / Fixed (see note 2)
D	1	Sensor break	R/O	No / Yes
D	2	Key lock	R/W	Keys enabled / disabled
D	3	N/A		
C	4	N/A		
C	5	Parameter changed via keys	R/W	No / Yes
C	6	N/A		
C	7	N/A		
B	8	Alarm 2 state	R/O	Off / On
B	9	N/A		
B	10	Alarm 1 state	R/O	Off / On
B	11	N/A		
A	12	Alarm active	R/O	No alarm/New alarm 1 or 2
A	13	SP 2 active	R/W	SP 1 / SP 2
A	14	Remote active	R/W	Local / Remote
A	15	Manual mode	R/W	Auto / Man

Optional Status Word (OS)

Format (>ABCD)

For programmers the numerical value of digit D (bits 0-3) has a value from 0-6 indicating the programme status.

Digit	Function	Attribute
D = 0	Reset programme / ramp	R/W
D = 1	N/A	
D = 2	Run programme / ramp	R/W
D = 3	Hold programme	R/W
D = 4	Programme end	R/O
D = 5	Ramp end (still active*)	R/O
D = 6	Programme in holdback	R/O

* After completing a ramp, should PV deviate from SP1, the working setpoint will ramp back to SP1 at the current ramp rate.

Digit	Bit	Function	Attribute	Clear / Set
C	4	Hold logged	R/O	Continue/hold
C	5	Skip current segm't	R/W	Remain/skip
C	6	Ramp/dwell	R/O	Ramp/dwell
C	7	Digital input lock	R/W	Enable/disable
B	8	Segment no.(LSB)		
B	9	Segment no.	R/O	note 1
B	10	Segment no.		
B	11	Segment no.(MSB)		
A	12	Digital O/P2 (Output 4)	note 2	Off / on
A	13	Digital O/P1 (Output 3)	note 2	Off / on
A	14	Digital Input 2	R/O	Off / on
A	15	Digital Input 1	R/O	Off / on

Notes :-

- 1) Segment number is a nibble having the value 1 to 8 read only.
- 2) Bits 12 and 13 are normally R/O. In versions 4.11 or higher they become Read/Write if digital output 1 or 2 are configured to be controlled via communications.
C3(B) = 7 or C3(C) = 7

Extension Status Word (XS)

Format (>ABCD)

Digit	Bit	Function	Attribute	Clear / Set
D	0	Self tune	R/W	Off/on
D	1	Adaptive tune	R/W	Off/on
D	2	Spare		
D	3	Spare		
C	4	PID control	R/W	SP+PID/PID independent
C	5	Active PID set	R/W	PID 1 / PID 2
C	6	Digital output 0	R/W	Off/on
C	7	Spare		

For programmers the numerical value of digit B, (bits 8 to 11) is used to select or monitor the active programme number.

Digit B	Function	Attribute
B = 0	818P Single Programme	R/O
B = 1 - 4	818P4 Programme no.	R/W
B = 1 - 15	818P15 Programme no.	R/W

For valve positioners the numerical value of digit A (bits 12 to 15) is used to control or monitor the raise and lower outputs.

Digit A	Function	Attribute	
		Auto	Manual
A = 0	Outputs off	R/O	R/W
A = 1	Lower output on	R/O	R/W
A = 2	Raise output on	R/O	R/W
A = 3	Lower nudge*	-	W/O
A = 4	Raise nudge*	-	W/O

* Nudge is a pulse of minimum on time.

Digital Output Status Word 1 (01)

Format (>ABCD)

Status of output 3 during each segment

Digit	Bit	Segment	Attribute	Clear / Set
D	0	ramp 1 to output 3	R/W	Non active/active
D	1	dwell 1 to output 3	R/W	Non active/active
D	2	ramp 2 to output 3	R/W	Non active/active
D	3	dwell 2 to output 3	R/W	Non active/active
C	4	ramp 3 to output 3	R/W	Non active/active
C	5	dwell 3 to output 3	R/W	Non active/active
C	6	ramp 4 to output 3	R/W	Non active/active
C	7	dwell 4 to output 3	R/W	Non active/active
B	8	ramp 5 to output 3	R/W	Non active/active
B	9	dwell 5 to output 3	R/W	Non active/active
B	10	ramp 6 to output 3	R/W	Non active/active
B	11	dwell 6 to output 3	R/W	Non active/active
A	12	ramp 7 to output 3	R/W	Non active/active
A	13	dwell 7 to output 3	R/W	Non active/active
A	14	ramp 8 to output 3	R/W	Non active/active
A	15	dwell 8 to output 3	R/W	Non active/active

Software Key

	2.05 and below
	2.07 and above
	3.11 and above
	4.11 and above

Chapter 7.0 Calibration

The 818 controller can be calibrated whilst installed in its sleeve if the relevant wiring can be re-routed to the calibration device and the instrument is not configured for a pyrometer, high level voltage (greater than 60mV), or current input. Alternatively the instrument can be removed from its sleeve and calibrated on a bench, in which case it can either be plugged into an additional sleeve, part number LA021348 (faston connections) or LA021347 (screw connections), or be fitted with a number of individual connector blocks which are used in the make up of the sleeve. A set of three of these blocks, LA018341 (standard) LA021248 (Input) and LA018831 (mains) is required to calibrate the instrument fully.

To carry out the complete calibration of the 818 controller a number of instruments is required. These are listed below:-

- A suitable stable millivolt and voltage source with the ability to switch 'in' and 'out' some means to compensate for the cold junction of thermocouples. The Eurotherm calibrator model 239 is suitable for this purpose.
- A length of compensating cable suitable for the thermocouple to be used with the controller or type K.
- A decade resistance box capable of being set to 50.00 and 250.00 ohms with an accuracy better than ± 0.01 ohms. Alternately two precision resistors of this accuracy may be used.
- A digital voltmeter capable of indicating a maximum voltage of 10 volts DC with an accuracy of better than 0.05% and an input impedance higher than 5 Megohms.
- A digital current meter capable of indicating a maximum of 20mA DC with an accuracy of better than 0.05% and an input impedance of less than 400 ohms.

When the 818 instrument is despatched from the factory it has been calibrated for all thermocouples, RTDs, pyrometers, voltage and current inputs and if a remote input or retransmission has been specified in the ordering code these will also have been calibrated.

When reconfiguring the instrument from one sensor type to another or one range to another it is not necessary to recalibrate the instrument, providing that the full calibration has not been corrupted.

The recalibration procedure can either be performed for the configured input and output ranges only, or for all ranges.

Note 1:-

The full list of mnemonics that will have to be scrolled through to get to (i8) is shown below.

C1, C2, C3, C4, C5, C6, C7, C8, idn, dSL dSh, SPL, SPh, S2L, S2h, Ah1, Ah2, Add, C1L, C1h, C2L, C2h, C3L, C3h, roL, roh, rL, rLh, rIL and rih.

Note 2:-

After calibration follow the clear configuration operation in paragraph 7.8.

The table below shows which mnemonics have to be selected to calibrate a particular range and input.

The configured range of the instrument being calibrated	Selected Mnemonic
Pyrometer or voltage inputs where input span is < 8mV	i8
Pyrometer or voltage inputs where input span is > 8mV and is < 20mV	i20
Pyrometer or voltage inputs where input span is > 20mV and is < 50mV	i50
Zero Trim (may be used with all inputs)	tr
Thermocouple inputs where input span is < 8mV	i8 & CJC
Thermocouple inputs where input span is > 8mV and is < 20mV	i20 & CJC
Thermocouple inputs where input span is > 20mV and is < 50mV	i50 & CJC
RTD Inputs	rTL & rth
Analogue remote inputs	icL & ich
Analogue retransmission outputs	roL & roh
Motor valve position potentiometer	Pcl & Pch

To calibrate a single range use only those parts of the procedure containing the mnemonics in the above table.

7.1 Calibration Procedure

To alter the calibration of the instrument the configuration mode has to be entered.

- Remove the instrument from the sleeve and make the lower of the two switches on the rear of the microboard (see paragraph 4.1).
- Replace the instrument in its sleeve, or connect the terminal blocks.
- Now connect the instrument as in diagrams 1, 2, 3, 4 or 5 as appropriate. Power up the instrument and the calibrator.
- The upper display will now read 'CONF' and the lower display will read 'C1'. (C1 is the first mnemonic in the configuration list and is not required for calibration).
- Press the scroll button repeatedly until the first mnemonic of the calibration procedure is indicated (i8)
- Leave powered for at least 20 minutes before proceeding.

7.3 Calibration Cold Junction Compensation (cJc)

- 1) The leads between the calibrator and the instrument should now be changed for compensating cable, see diagram 2.
- 2) If the instrument has been configured for a thermocouple input the compensating cable should be for this thermocouple type.
- 3) If the instrument has been configured for a non-thermocouple input; eg. RTD, pyrometer, millivolts or current, then the compensating cable should be type K.
- 4) The compensation of the calibrator should be set to the same type as the compensating cable from the calibrator to the instrument.
- 5) Set the output of the calibrator to a value that represents 25°C for the thermocouple type to which the instrument has been calibrated - ie. if type K, then set value at 1.000mV.
- 6) Press the 'scroll' button until 'cJc' is displayed.
- 7) The 'up' and 'down' buttons should now be pressed together and the 'cJc' will disappear.
- 8) The top dot of the LSD will flash for approximately 15 seconds.
- 9) The display will now read the temperature in °C as 25.0.
- 10) If the reading drifts by more than a few tenths of a degree in 30 seconds the calibration of 'cJc' has been unsuccessful. Check the calibrator, instrument and compensating cable wiring.
- 11) Press the 'up' and 'down' buttons simultaneously together to repeat the calibration of 'cJc'.
- 12) If the reading is to be accepted press the scroll button.
- 13) If no further calibrations are required leave configuration as described in 7.8.

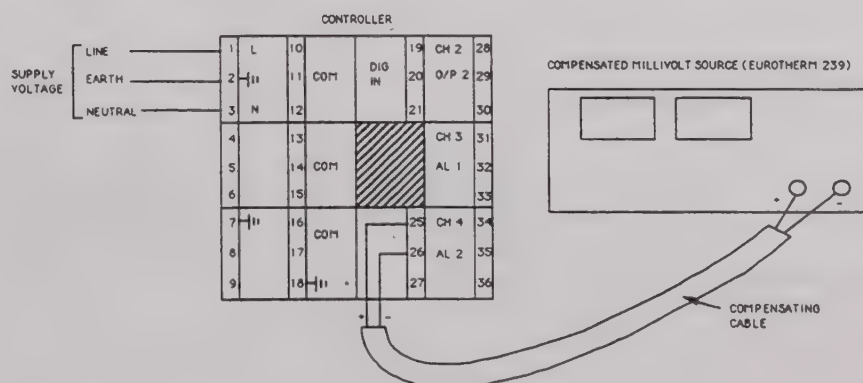


Diagram 2. Connections for C.J.C. Calibration Procedure

7.5 Calibration of Remote Input

If the controller is fitted with an analogue comms board or a D.C. remote input board and the input of this board requires calibration, use the next mnemonics in the configuration list 'icL' and 'ich' for this purpose. Note: If this input is current rather than voltage the burden resistor normally connected on the back of the sleeve must not be fitted during calibration. The voltages used for calibrating these inputs are the relevant currents, in milliamps, multiplied by 50.

1) Connect a voltage source such as the Eurotherm 239 to terminals 15 and 17 (analogue comms board) or 35 and 36 (remote input board) using copper wire as shown in diagram 4.

2) Press the scroll button and the display will now read 'icL'. Set the voltage source to the minimum input span.

Note:-

If the instrument has been configured with a 20% offset i.e. configuration 'C5' character 'D' set to 1 then the setting must be zero.

3) Press the 'up' and 'down' buttons together.

4) The top dot of the L.S.D. will flash for approximately 15 seconds.

5) icL will then be displayed as a percentage of the max span.

6) If this value in 6) above drifts significantly reset the voltage source and repeat paragraphs 4, 5 and 6.

7) Press the scroll button and the display will now read '1ch'.

8) Set the voltage source to the maximum input span volts.

9) Press the 'up' and 'down' buttons together.

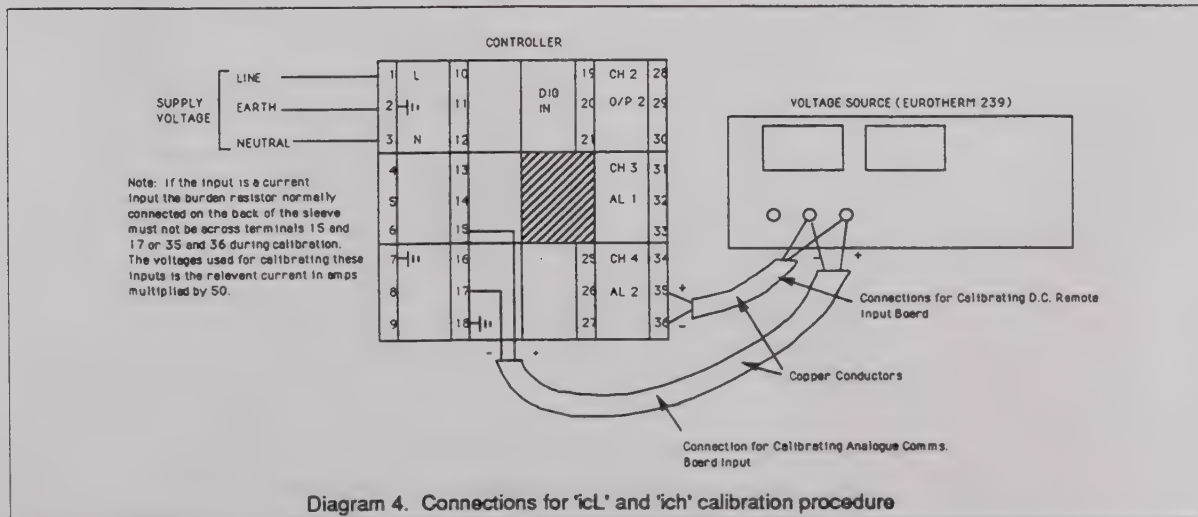
10) The dot of the L.S.D. will flash for approximately 15 seconds.

11) Ich will then be displayed as a percentage of the max. span.

12) If this value is incorrect reset the voltage source and again repeat paragraphs 10, 11 and 12.

13) If the value is correct press the scroll button.

14) If no further calibrations are required leave configuration as described in 7.8.



7.7 Calibration of Valve Positioner Potentiometer

(Only applicable to the Valve Positioner version of the model 818 configured to use the valve position potentiometer)

The calibration of the valve position potentiometer should be carried out with the instrument wired to the valve motor it is going to control, as shown below.

- 1) Remove the instrument from its sleeve and make the lower of the two switches on the rear of the microprocessor board. (see paragraph 2 of chapter 4.1).
- 2) Replace the instrument in its sleeve and switch 'on'.
- 3) The upper display will now read 'CONF' and the lower display will read 'C1'.
- 4) Press the 'scroll' button repeatedly until the mnemonic 'PcL' is displayed.
- 5) Use the 'up' and 'down' buttons to drive the motor to the position representing the minimum valve opening required.
- 6) Push the 'manual' button to enter this value.
- 7) Press the 'scroll' button to index to the mnemonic 'Pch'.
- 8) Use the 'up' and 'down' buttons to drive the motor to the position representing the maximum valve opening required.
- 9) Push the manual button to enter this value.

This calibration procedure rescales the potentiometer, under the mnemonic 'op' making the maximum and minimum selected positions now equal to 100% and 0% respectively. In auto control the valve movement is limited to these or the potentiometer limit values if these are set closer.

7.8 Clear Configuration

- 1) Push the scroll button again to index to the mnemonic 'Clr'.
- 2) Press the 'up' and 'down' buttons together.
- 3) Remove the instrument from its sleeve and open circuit the lower of the two switches on the rear of the micro board (See paragraph 2 of chapter 4.1)
- 4) Replace the instrument into its sleeve.

Note:-

Failure to carry out this part of the procedure will cause an error message to be displayed when returning to user mode.

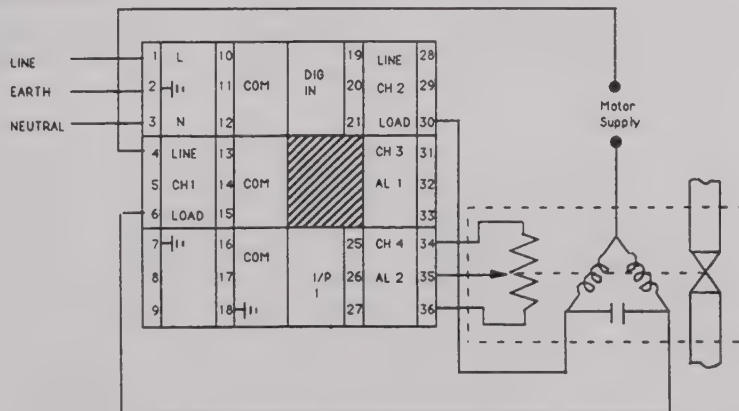


Diagram 6. Connections for 'PcL' and 'Pch' calibration procedure.

Chapter 8.0 Spares List

ITEM	PART NUMBER
Complete power supply board without output module (85-264V~ Input)	SUB 818-SPARE-POWERSUP-BOARD
Complete power supply board without output module (18-40V~ or 20-40V dc Input)	SUB 818-SPARE-24VOLT-BOARD
Complete power supply board with CNOMO output stages~(85-264V~input)	SUB 818-SPARE-CNOMO-BOARD
Complete microprocessor board with micro-processor Xicor non volatile memory and software. Include model number and software version number in order code;	e.g. SUB 818-SPARE-MICRO-BOARD-818S-210
Complete microprocessor board with micro-processor, Dallas non volatile memory and software. Include model number and software version number in order code;	e.g. SUB 818-SPARE-DALLAS-BOARD-818P4-411
Complete options board without output or alarm boards	SUB 818-SPARE-OPTION-BOARD
Complete options board with valve position potentiometer circuit	SUB 818-SPARE-VP-BOARD
Complete digital communications board	SUB 818-SPARE-DIGCOMM-BOARD
Complete analogue communications board	SUB 818-SPARE-ALALG-COMM-BOARD
Complete display PC board with display	SUB 818-SPARE-DISPLAY 818-BOARD
Complete relay output module board	SUB 818-SPARE-RELAY-BOARD
Complete triac output module board	SUB 818-SPARE-TRIAC-BOARD
Complete logic output module board	SUB 818SPARE-LOGIC-BOARD
Complete dc retransmission output module board	SUB 818-SPARE-RETRAN-BOARD
Complete dc output module board	SUB 818-SPARE-DCOUTPUT-BOARD
Complete dc input module board	SUB 818-SPARE-DCINPUT-BOARD
Microprocessor Intel 8032	CR200069
Non volatile memory (2004) Xicor	CR100040
Non volatile memory (DS1220) Dallas	CR200088
EPROM 27512 programmed with software for specific model number and version number	e.g. EPROM-818S-2.10
Fuse 500mA 250V anti-surge	CS021199
Fuse 1.25A anti-surge	CS022078
Links small	CI069127
Links large	CI020907
Bezel assembly complete with push buttons	LA021346
PC board retainer	LA021251
Covers (2 off)	LA021343
Instrument sleeve (faston)	LA021348
Instrument sleeve (screw)	LA021347
Behind panel fixing clips (kit of 2)	LA020067
Extender cable (set of 3)	LA021585
Rear terminal connector blocks (Screw)	
Standard	LA018341
Input (T/C and RTD)	LA021248
Mains (Red)	LA018831

GROUNDING

All "ground" terminals must be securely connected to ground by conductors appropriate to the current ratings of the units.

Most Eurotherm instruments have internal circuits which are isolated or "floating." This is necessary to prevent the occurrence of a "ground loop" in signal circuits. To avoid possible shock hazards in the event of an internal fault causing breakdown of insulation, it is recommended that all equipment connected to any Eurotherm unit be enclosed in a grounded metal enclosure. Sheaths of thermocouples (or other sensors) should be properly grounded by a separate conductor (instead of being dependent on grounding via the machine framework).

SUPPLY ISOLATORS

Every electrical system should be provided with means for isolating the system from the AC supply to allow safe working during repair and maintenance. SCRs and triacs are not adequate means of isolating the supply, and should always be backed by a suitable mechanical disconnect switch.

TEMPERATURE SENSOR FAILURE

In the event of sensor failure (i.e., thermocouple break or open input circuit) the instrument might display erroneous readings before indicating the input fault condition. For example, upon thermocouple break, the display reading rises rapidly before an indication occurs.

HAZARDOUS ATMOSPHERES

Unless otherwise stated in the published specification of any particular unit, Eurotherm products are not suitable for use in areas subject to hazardous atmospheres. No Eurotherm product should be connected to a circuit which passes into or through a hazardous area unless appropriate precautions are taken (even though the instrument itself may be located in a safe area). Such an installation should conform to the requirements of the relevant Authority. (In the USA: Factory Mutual Research Corporation and Underwriters' Laboratories, Inc.).

PROCEDURE IN THE EVENT OF TROUBLE

Before beginning any investigation of a fault, the electrical supplies to all equipment concerned should be switched off and isolated. Units suspected of being faulty should be disconnected and removed to a properly equipped workshop for testing. Any attempt to troubleshoot while installed could be hazardous to personnel and equipment.

IF IN DOUBT, ASK !

If you have any questions regarding any aspect of installing, operating or servicing your Eurotherm equipment, please contact your nearest Eurotherm Sales and Service Representative.

GROUNDING

All ground wiring must be properly installed in ground by permanent connections to the ground plane of the case. Most equipment is grounded to the chassis ground. It is essential to provide the equipment with a ground plane. To avoid potential safety hazards in the event of an electrical fault, the equipment must be grounded to a common earth reference. Grounding of the equipment is done by a single conductor from the equipment to the chassis ground.

SUPPLY ISOLATION

Every electrical system must be properly isolated from the chassis ground. No supply is allowed to be connected to the chassis ground. The supply is not connected to the chassis ground and should always be isolated by a double insulated power cord.

TEMPERATURE ERROR FAILURE

In the event of a temperature error, the equipment must be shut down. The equipment must be shut down before the temperature error occurs. The equipment must be shut down before the temperature error occurs. The equipment must be shut down before the temperature error occurs.

WIRING AND ATTACHMENTS

Wiring must be done in the equipment enclosure or on the chassis. All wiring must be done in the equipment enclosure or on the chassis. All wiring must be done in the equipment enclosure or on the chassis. All wiring must be done in the equipment enclosure or on the chassis. All wiring must be done in the equipment enclosure or on the chassis.

REWORKING IN THE EVENT OF FAILURE

When reworking the equipment, it is essential to follow the proper procedures. The equipment must be shut down before the reworking is done. The equipment must be shut down before the reworking is done. The equipment must be shut down before the reworking is done. The equipment must be shut down before the reworking is done.

IF IN DOUBT, ASK

If you have any questions regarding the safety of the equipment, please contact your nearest Electronic Data Systems representative.

MP MASTER



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